

SOUTH

DAKOTA

FISHERIES

**Angler Use and Harvest Surveys on
Coldbrook Reservoir, Sylvan Lake, Center Lake,
Horsethief Lake, Canyon Lake,
and Iron Creek Lake
South Dakota, May-August 2007**

**South Dakota
Department of
Game, Fish and Parks**
Wildlife Division
Joe Foss Building
Pierre, South Dakota 57501-3182

**Completion Report
No. 08-02**

**Angler Use and Harvest Surveys on Coldbrook Reservoir, Sylvan Lake,
Center Lake, Horsethief Lake, Canyon Lake and Iron Creek Lake, South
Dakota, May-August 2007**

By

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PREFACE

The data and summaries presented in this report were collected in 2007. This is an annual report. Copies of this report and reference to the data is not for publication and can only be made with written permission from the author(s), Director of the Division of Wildlife, or the Secretary of the South Dakota Department of Game, Fish and Parks, Pierre, South Dakota 57501-3182.

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EXECUTIVE SUMMARY

This report includes angler use and harvest information from May 15 – August 31 2007 for Coldbrook Reservoir, Sylvan Lake, Center Lake, Horsethief Lake, Canyon Lake and Iron Creek Lake, South Dakota. Creel surveys in the Black Hills are part of the tools available to managers and are used in the decision making process for managing Black Hills waters. This survey was initiated to determine angler harvest and catch of fish species found in small Black Hills lakes. These waters were selected to represent the small lake portion of a larger study that will determine the amount of pressure that the Black Hills fisheries receive. This is the first time that these small lakes have had concurrent creel surveys. Specific questions regarding angler preferences were asked to aid in determining the future management plans for Black Hills fisheries.

Four goals and one specific management objective were set forth to determine the characteristics of these Black Hills small lakes in 2007. Our goals were:

Goals of the 2007 Creel Survey

1. Quantify the extent of angler use (pressure) in the small lakes in the Black Hills.
2. Determine angler harvest of trout and other species in small lakes in the Black Hills.
3. Determine angler satisfaction on small lakes during the summer of 2007
Management Objective. Maintain angler satisfaction on small lakes equal or exceeding the 2003 Black Hills Average of 66%.
4. Determine angler preferences towards the fishery resources on small lakes in the Black Hills.

Over 1,000 interviews from angler's using several small lakes in the Black Hills were used to determine use and preference. Angler use on the small lakes of this study totaled 42,512 hours from May 15 to August 31, 2007. Specific pressure at each small lake varied greatly. Nearly one-quarter of the total pressure came from the Iron Creek Lake. Coldbrook Reservoir received the lowest angling pressure of the small waters sampled in 2007.

Harvest of rainbow trout at all of the small lakes totaled 20,746. These harvest data can be combined with pressure information to give overall harvest rates ranging from 0.17/hr at Coldbrook and Canyon Lakes to 0.78/hr at Sylvan Lake. About one-half of the trout caught from small lakes were harvested. A goal of harvesting 0.5 trout per hour for catchable trout stocked was achieved in three of the six small lakes sampled in 2007. Changes of angler attitudes towards catch and release angling may be compromising the reaching of this goal.

Satisfaction of anglers using these small lakes in the Black Hills was above the last statewide average level of satisfaction. Small pond anglers responded with a satisfaction level ranging from 73% to 86%. The Canyon Lake urban fishery was the lowest in angler satisfaction in 2007. Anglers at Horsethief Lake expressed the highest level of satisfaction.

Anglers were variable in their responses to preference questions. Small pond anglers were not overly satisfied with the size of trout caught during 2007. Only 54% of anglers were satisfied with the size of trout at Sylvan Lake. Anglers at other lakes expressed lower size satisfaction than Sylvan Lake. Canyon Lake anglers were the lowest in regards to size satisfaction at 23%. At most small ponds, angler said that they normally keep about one-half of the trout the caught. Exceptions to this trend were evident but were offset due to “no opinion” responses.

Almost universally, queried anglers responded to the question regarding their opinion of their day of fishing as being good, fair or poor. Excellent and very poor were the two extremes available to anglers that were rated low. This is the first time that this question has been asked of anglers on small ponds in the Black Hills.

Demographics of anglers using the different fisheries produced some interesting data. For many of the small lakes the use came from resident anglers. Exceptions to the predominate resident use occurred at Sylvan Lake (44% non-resident use). Canyon Lake (94%), Coldbrook Reservoir (86%) and Iron Creek Lake (85%) were very highly oriented towards the resident angler. Earlier Black Hills creel surveys have shown that most anglers are male. In 2007, nearly two thirds of the anglers at small lakes were male.

TABLE OF CONTENTS

PREFACE	ii
EXECUTIVE SUMMARY	iii
Goals of the 2006 Creel Survey	iii
TABLE OF CONTENTS	v
LIST OF TABLES	vi
LIST OF FIGURES	vii
LIST OF APPENDICES	viii
INTRODUCTION	9
DESCRIPTION OF STUDY AREAS	10
SAMPLING METHODS	12
Angler Use and Sport Fish Creel Survey	12
RESULTS & DISCUSSION	13
Angling Pressure	13
Pressure estimates from each water	13
History of Pressure Estimates	15
Catch	17
Coldbrook Reservoir	17
Sylvan Lake	17
Center Lake	18
Iron Creek Lake	18
Horsethief Lake	18
Canyon Lake	18
Harvest	19
Angler Satisfaction and Opinions	20
Angler Satisfaction	20
Angler Preferences	22
Demographics	24
RECOMMENDATIONS	26
LITERATURE CITED	27
Appendix	29

LIST OF TABLES

Table 1. Creel survey parameters and representative values gathered during the 2007 Black Hills Preference Survey.....	14
Table 2. History of pressure estimates from selected small lakes in the Black Hills of South Dakota.	16
Table 3. Totals of harvested trout, stocked trout and the ratio of harvest to stocked trout determined during the 2007 Black Hills Creel Survey.....	20
Table 4. Satisfaction of anglers, demographics and preference responses made during the small pond section of the 2007 Black Hills Preference Survey.....	23

LIST OF FIGURES

Figure 1. Geographic locations of waters sampled during the 2007 creel survey season.	12
Figure 2. Small pond angler satisfaction levels during the 2007 Preference Survey.	22

LIST OF APPENDICES

Appendix 1. Creel Survey Interview Form used by creel clerks during the 2007 Preference Creel Survey.	29
Appendix 2. Creel Survey Pressure Form used by creel clerks during the 2007 Black Hills Preference creel survey.	30

INTRODUCTION

Anglers at six Black Hills small reservoirs were interviewed to measure angler pressure, fish harvest and angler satisfaction from May 15 to August 31, 2007. These specific waters were selected from several factors which included, popularity, geographical location and closeness to popular tourist destinations. Management on all of these waters is similar in that they are managed as put-and-take fisheries utilizing catchable rainbow trout (approximately 11-inches in length). Harvest regulations on all waters included in this report consist of five trout per day with one over 14-inches.

Ongoing creel surveys within the Black Hills Trout Management Area indicate their importance towards data gathering and eventual understanding of the fishing public. They have been used to determine angler use, preference and satisfaction of anglers using the Black Hills natural resources. For nearly sixty years, creel surveys have been used in a variety of ways to determine stocking success, changes in management strategy and overall use of an area (Simpson 2005). Only once has the entire fishery of the Black Hills been surveyed (Stewart 1963). Angling use was estimated from pressure counts at the waters and from an intensive study at Iron Creek Lake. In the 1963 study, the survey consisted of 11 AM counts and extrapolation of pressure from the standard of measure (Iron Creek Lake). Gathering information in this format estimates overall pressure but lacks sensitivity in response to harvest or human dimension information on any specific waterbody. This later information is important in determining the direction of fisheries management in local, regional or statewide manners. A second attempt to survey anglers on these waters occurred in 1994, but due to low numbers of interviews, the statistical value of this data is limited (Erickson and Galinat 2005).

Gigliotti (1977 and 2006) measured angler attitudes and preferences utilizing techniques of mailout surveys. From these data, knowledge of the diversity of angler attitudes in the Black Hills was documented. Furthermore, it has also been acknowledged that there is difficulty in addressing all of the needs or desires of all anglers.

Trout in the Black Hills originated with the first stockings in 1886 (Barnes, in press). Many of the first stockings were fry or fingerling trout but by the mid-1950's the practice of adult or catchable stocking became prevalent (SDGFP stocking database). Although many different species of trout have been stocked in Black Hills waters, rainbow trout are the most prevalent species recently used.

DESCRIPTION OF STUDY AREAS

Coldbrook Reservoir

Located in the southern Black Hills, Coldbrook Reservoir has consistent water levels and provides a unique and popular recreation area for visitors. At 32-acres, Coldbrook Reservoir was the largest of the small waterbodies sampled during the creel surveys of 2007. The lake is owned and managed by the U.S. Army Corps of Engineers and is mostly used by the local public for swimming, fishing and limited boating. A small campground is located near the lake.

Sylvan Lake

Sylvan Lake is very popular with summer tourists as it is located within the boundaries of Custer State Park. This area is also the starting point for hikers who travel to Harney Peak (tallest point in South Dakota). Users of Sylvan Lake pursue different aspects of this unique area and include fishing, hiking, picture taking, and boating. The lakeshore and dam are owned by Custer State Park. At only nineteen acres, Sylvan Lake was the second smallest waterbody sampled in the 2007 creel surveys.

Center Lake

Center Lake is located within Custer State Park, but is more remote than Sylvan Lake and other nearby waters that visitors might visit. To this extent, Center Lake is more highly used by residents as a popular camping, fishing and boating destination. A swim beach is located along the shores of Center Lake.

The Black Hills Playhouse, a popular visitor attraction is located near the lake. The dam and lakeshore are managed by Custer State Park.

Horsethief Lake

Located in the central Black Hills, Horsethief Lake is geographically close to the famous Mt. Rushmore. At sixteen acres, Horsethief Lake was the smallest of all waters sampled in 2007. Horsethief Lake has good shore access for anglers. The U.S. Forest Service is the owner of the dam, lakeshore and adjacent campground.

Canyon Lake

Canyon Lake is located within the city limits of Rapid City. A large number of activities occur in and around the lake including fishing, boating, walking, picnics and waterfowl feeding. The surrounding lakeshore and dam ownership are all owned by the City of Rapid City. Being in a high profile area, many users are concerned over the aesthetic aspect of Canyon Lake. Canyon Lake went under a large renovation project in the late 1990's including dredging sediment and shoreline fishing access.

Iron Creek Lake

Located in the northern Black Hills, Iron Creek Lake is popular with people familiar with the area. Heavy activity of use occurs from the Spearfish community, but other long-traditional visitation occurs as well. Many anglers have their favorite fishing spot around the lakeshore while boats tour the deeper waters in search of their catch. On any hot day, the swim beach is popular with other users of this area. Ownership of the lake is somewhat complex as the deed of record states that there was an original transferal of 85 acres consisting of a border of 120 feet around the lake for public access. More recent conversations indicate there may be some ownership of the dam by the U.S. Forest Service, yet there are legal records that indicate otherwise.

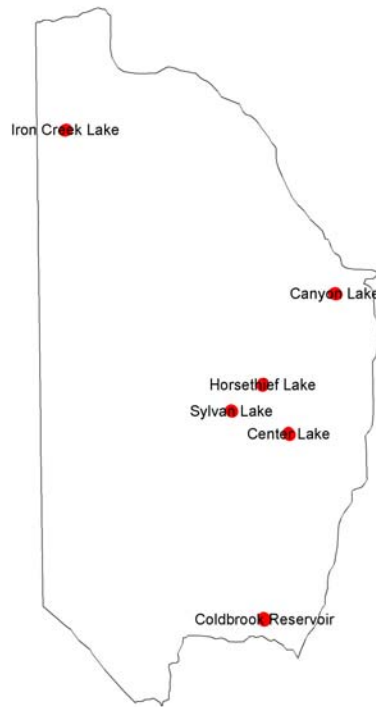


Figure 1. Geographic locations of waters sampled during the 2007 creel survey season.

SAMPLING METHODS

Angler Use and Sport Fish Creel Survey

An angler use and preference survey was conducted from May 15 to August 31, 2007. The creel survey was comprised of two independent parts: instantaneous pressure counts and angler interviews conducted between pressure counts. Each creel shift consisted of two randomly picked pressure counts. Interviews were only conducted with those anglers who had completed their fishing trip. Angler interviews provided information on trip length, species caught, numbers of fish caught and released, angling method, angler preferences and angler satisfaction.

A stratified random creel survey was used. Creel surveys were performed throughout the week and were divided into two strata: 1) weekend/holiday and 2) weekdays. Emphasis was placed on weekends with both days receiving creel

attention. Favor was placed on weekend anglers, as it was believed that most interviews would occur at this time. Days were stratified by AM and PM shifts. Half of all shifts, on a monthly basis, were randomly assigned to be conducted in the AM and half were conducted in the PM during daylight hours.

Four preference questions were asked of anglers during the 2007 Black Hills Preference Creel Survey. Each angler was asked the following question: "Considering all factors, how satisfied are you with today's fishing trip?" The respondents were given their choice of five different responses: Very satisfied, Moderately Satisfied, Neutral, Moderately Dissatisfied and Very Dissatisfied. This question has been asked during prior creel surveys across the state. Anglers were also asked if they were satisfied with the size of the primary-sought fish species, if they were likely to catch and release fish, or were more harvest oriented. Finally, anglers were asked how they would rate the fishing today. The respondents were given a choice of six different responses: Excellent, Good, Fair, Poor, Very Poor or No Opinion.

The South Dakota Department of Game, Fish and Parks analyzed all information after entering into Creel Application Software (CAS) Creel Survey Data Entry/Analysis Program (Soupir and Brown 2002).

RESULTS & DISCUSSION

Angling Pressure

Pressure estimates from each water

Estimates of fishing pressure allow managers to determine the overall use of the angler component of a fishery. Having these estimates available in a long-term dataset is beneficial to determine trends of a fishery. For many waters sampled in 2007, either this was the first time for a creel survey or there is no recent creel survey.

Pressure varied greatly between sampled lakes (Table 1). Pressure estimates from sampled lakes varied from 2,172 hours (Coldbrook Lake) to 10,978 hours at Iron Creek Lake. This variance in pressure indicates the popularity of specific waters and the overall use of some of our more popular small lakes. Each lake was selected based on unique characteristics (geography or adjacent area to tourist attractions) or are historically popular fisheries.

Table 1. Creel survey parameters and representative values gathered during the 2007 Black Hills Preference Survey.

	Pressure (total hours)	Catch, Harvest and Release Rates (trout)			Catch, Harvest and Release Numbers (trout)		
		Catch	Harvest	Release	Catch	Harvest	Release
Coldbrook Lake	2,172	1.29	0.17	0.18	2,797	1,159	1,638
Sylvan Lake	8,101	1.59	0.78	0.81	12,882	6,318	6,563
Center Lake	5,368	1.21	0.37	0.85	6,527	1,960	4,567
Iron Creek Lake	10,978	1.00	0.70	0.30	10,935	7,669	3,266
Horsethief Lake	6,407	0.77	0.32	0.45	4,941	2,056	2,885
Canyon Lake	9,486	0.35	0.17	0.18	3,300	1,584	1,715
Total	42,512	--	--	--	41,382	20,746	20,634

The overall pressure on the small lake fisheries sampled totaled 42,512 hours of recreation. Two lakes, Iron Creek and Canyon Lake, comprised almost one-half of the total hours of small lake fishing in the sampled waters during 2007. The low hours at Coldbrook Reservoir testifies to the diversity of use at this lake. Many users of this area swim, boat or have a more general use than just angling.

History of Pressure Estimates

Iron Creek Lake was intensively surveyed in the late 1950's to determine stocking levels that would produce consistent catch rates for anglers (Sowards 1960). Included in the analysis was the return of stocked trout and estimates of catch and harvest from four, twenty-eight day periods during the summers of 1957-1959. During the summer months, 13,905 angler days (44,050 angler hours) were determined by this survey. This yearlong survey also demonstrated that most anglers utilize this area in the summer (82% of total usage). Other important information determined in this survey included the fact that anglers were more likely to spend a longer period fishing if they caught fish (2.36 hours if unsuccessful, 4.14 hours if successful).

There are some differences between Sowards (1960) and this survey. For example, the earlier study gathered data from specific day-long census periods. The study design of this survey investigated angler use and harvest for one summer and was structured in a randomized fashion (see Methods and Materials). Beyond the initial difference, the focus of each study was different as Sowards was investigating catch rates and harvest of trout in comparison with the standing stock of fish in Iron Creek Lake. This survey placed heavy emphasis on angler satisfaction and desires along with standard creel survey information. Despite the design and focus differences between the studies, there are some basic informational data (i.e. catch rates and harvest) that remains comparable.

Following Sowards (1960) study on fish stocking and harvest rates on Iron Creek Lake, Stewart (1963) utilized a method to determine the amount of fishing pressure on many Black Hills lakes based on 11am counts. A level of back referencing towards the Iron Creek example provided a basis for estimating angling pressure for many waters (Table 2). Stewart further described the use of these angling hours to the following years stocking levels in these lakes. A follow-up study (Lyons 1964) demonstrated that a fair amount of yearly variability exists among fishing efforts at specific waters.

Table 2. History of pressure estimates from selected small lakes in the Black Hills of South Dakota.

Lake	Estimated Pressure (Stewart 1963)	Estimated Pressure (Lyons 1964)	Estimated Pressure (Simpson 2002-2007)
Iron Creek Lake	16,942	19,225	10,978
Coldbrook Lake	9,948	9,153	2,172
Center Lake	6,648	10,604	5,368
Sylvan Lake	20,074	21,407	8,101
Canyon Lake	28,754	22,011	9,486
Horsethief Lake	9,354	14,549	6,407
Total Pressure	91,720	96,949	42,512

The compiled data from previous creel surveys may be misleading for a number of reasons (Table 2). First, these surveys were not performed in a statistically randomized fashion. The focus of these surveys was not to determine the extent of the fishing pressure at the lakes, but rather to investigate the stocking protocols and their effects. Second, the small sample size of counts certainly allow for a wide variety of error (i.e. confidence limits) to incur to the overall pressure levels. It is reasonable to expect that the estimated pressure levels may have been overestimates of the true pressure. By performing the creel survey with randomness in day and count periods, a more statistically appropriate estimate can be determined.

Another comparative creel survey was performed by the staff at Custer State Park (CSP) in 1986 (SDGFP unpublished data). The focus of this survey was to investigate angler use at several small ponds within the CSP boundaries. Although lacking in scientific design, well over 700 anglers were contacted during this survey. Anglers were contacted while fishing and due to this survey structure, pressure estimates were not able to be calculated. Anglers were asked as to their frequency of fishing at CSP lakes. Residency of anglers, species preference and an estimate of catch rates was derived from the data.

Results of the 1986 CSP survey indicated that 72% of anglers using CSP lakes were residents, most were fishing for trout (except anglers at Stockade Lake). Finally, there was split between catch rates at the different lakes. Some waters (Sylvan and Center Lakes) were above the stated goal of 0.5 trout per hour while other lakes were behind these harvest rates (Stockade and Legion Lakes).

Catch

Lagler (1956) described one of the primary goals for fisheries management as being to creation and maintenance of the maximum possible standing crop of fish available to the angler. Principle to the measure of this endeavor is the creel survey and more specifically the component of catch. Catch is defined as the number (or weight) of all fish (any or all species) caught by anglers, whether the fish were kept or released (Pollock et al 1994). Often there is a time component placed on the criteria that yields items per unit of effort (ex. Hour or Day). Both catch and catch rate was determined in this study.

Coldbrook Reservoir

Total catch of fish in Coldbrook Reservoir was estimated at over 5,000 fish of which 2,797 were stocked rainbow trout (Table 1). Overall, there was a catch rate on fish of 2.31 fish per hour and rainbow trout catch rate was 1.29 trout per hour. The estimated catch rate of trout was the second highest of all small bodies of water sampled during 2007.

Sylvan Lake

The estimated catch from Sylvan Lake was the highest of any small lakes creeled in 2007 (12,882 fish caught, Table 1). All of the fish caught from Sylvan Lake were reported to be stocked rainbow trout. The catch rate was calculated to be 1.59 trout per hour. Slightly over 4,900 trout were stocked into Sylvan Lake during the creel period. Therefore, the number of times any specific trout might be caught due to catch and release fishing was 2.6.

Center Lake

Center Lake had the third highest catch of fish from all the small lakes surveyed during 2007 (Table 1). Of the 6,527 fish caught, most were the stocked rainbow trout. Only 3,584 rainbow trout were stocked during the survey period.

Iron Creek Lake

Anglers at Iron Creek Lake had the second highest total catch of trout for all the lakes sampled in 2007 (Table 1). Catch rates at Iron Creek Lake were the fourth highest of all small lakes sampled. The differences between catch and catch rates may in part be due to the amount of pressure at this lake which, when high would decrease the overall catch rate. This implies that anglers must fish a longer period, and appear willing to do so, to catch their trout. Comparing the number of trout stocked vs. the number of estimated trout caught provides some interesting insight. During the 2007 creel survey, 4,916 trout were stocked into Iron Creek Lake. Comparison of the trout stocked to the estimated number of trout caught (10,935) indicates that the trout may be caught and released at an average of 2.65 times. Other alternatives also exist, such as carry over from earlier stockings, natural reproduction and errors in data processing.

Horsethief Lake

The catch of trout from Horsethief Lake was the second lowest of lakes sampled in 2007 (Table 2). Catch rates on stocked trout were also very low from this fishery. A ratio of the stocked fish to the estimated trout catch was 1.46. This indicates that a trout stocked into Horsethief Lake is likely to be caught an average of about one and one-half times. The abundance of green sunfish in Horsethief Lake may have interacted with the trout catch by reducing it by some unknown extent.

Canyon Lake

The estimated catch of trout from Canyon Lake was the second lowest of all waters sampled in 2007. A corresponding low catch rate of 0.35 trout per hour also indicates low success from anglers. A known issue in Canyon Lake has been the recent introduction of northern pike by unknown sources. In the

past there has been speculation that northern pike have been a detriment to trout fishing in other Black Hills waters. The presence of northern pike and the low catch (rates and overall catch) indicate that this may be a problem in Canyon Lake as well.

Harvest

Harvest of a fishery is the portion of fishing where fish are taken for use. Because anglers can return their catch (catch and release), harvest of fish is generally treated as a component of the overall catch (Malvestuto 1996). Harvest commonly has a unit of time applied to the numeration, referred to as harvest per hour (HPUE).

Stocked trout in the Black Hills have criteria set in place for overall goals in regards to return to the angler. Stated goals from the 1968 Black Hills Trout Management Plan were to stock catchable trout with the following returns: harvest of 75 percent of stocked catchable trout, and minimum of angler success of 0.50 trout per hour (for streams). Applying these criteria to a fishery today may not be as applicable today since there appears to be a greater number of anglers practicing catch and release. Nonetheless, data from anglers and their stated preferences aid managers in development of particular activities that should maintain or improve angler satisfaction.

Statistics were run concerning the amount of trout harvested compared to the trout stocked (Table 3). Either excess trout over the number stocked were from a stocking earlier in the year or possibly were even carryover trout from the previous year. No trout were tagged or otherwise marked so there can be no definitive conclusions concerning harvest or harvest rates.

Table 3. Totals of harvested trout, stocked trout and the ratio of harvest to stocked trout determined during the 2007 Black Hills Creel Survey.

	Harvest	Stocked	Harvest/Stocked ratio
Coldbrook Reservoir	1159	3162	0.37
Sylvan Lake	6318	4916	1.28
Cener Lake	1960	3584	0.55
Iron Creek Lake	7669	4128	1.86
Horsethief Lake	2050	3372	0.61
Canyon Lake	1584	2402	0.66
Total	20740	21564	--

Angler Satisfaction and Opinions

Angler Satisfaction

Recreational creel surveys commonly examine pressure and catch data for specific waters. In the Black Hills, this was often the case as well, until the late 1990's when aspects of angler attitudes and preferences were examined. This has become a common aspect of creel surveys in the Black Hills. Angler preferences permits managers to gauge how management activities are being accepted, and presents a direct contact with the user group. This communication aids in determining if accomplished angling goals are met. Four distinct questions were developed for the 2007 Black Hills Creel Survey. The specific question and possible responses have been given earlier (see Methods and Materials).

Another study that was being performed during the 2006-2007 Black Hills Creel Surveys used a mail-survey format (Gigliotti 2006). Anglers were contacted based on the variety of license types available. Using the mail survey additional questions were able to be asked and as such there are more detailed responses and separation into the "type" of angler based on earlier responses. Satisfaction and the breakdown by angler type (nature, social, relaxation,

excitement, food and sport) showed that most resident anglers rated their fishing experience at only 56% satisfaction. Most non-resident anglers responded between fair (23.1%) and good (37.5%).

During the 2007 Black Hills Creel Survey there were a number of differences between angler satisfaction or preferences from the different waters. At three of the waters sampled, anglers expressed angling satisfaction over 80% (Coldbrook Reservoir, Sylvan Lake, Horsethief Lake) (Figure 2). The other three waters (Center Lake, Iron Creek Lake, Canyon Lake) were below the 80% satisfaction level.

To evaluate the change overtime a single comparable study or evaluation is the best approach. For these purposes, the most appropriate comparison is to use the mail survey as similar approaches were used in 2003 and 2006. In 2003, a statewide level of angling satisfaction was 63.4% (Gigliotti 2003). Comparison with 2006 data (56%) was a decline in the overall satisfaction level was observed (Gigliotti 2006). The catching of trout has been closely related to fishing satisfaction (Gigliotti 2006). One solution to increase the fishing satisfaction is thus to increase the number of trout caught which in turn implies that there must be more trout available in the water. In the case of small lakes, the alternative for increasing the number of trout is to increase the stocking rates and the catch rates should correspond.

Satisfaction Levels of Small Pond Anglers

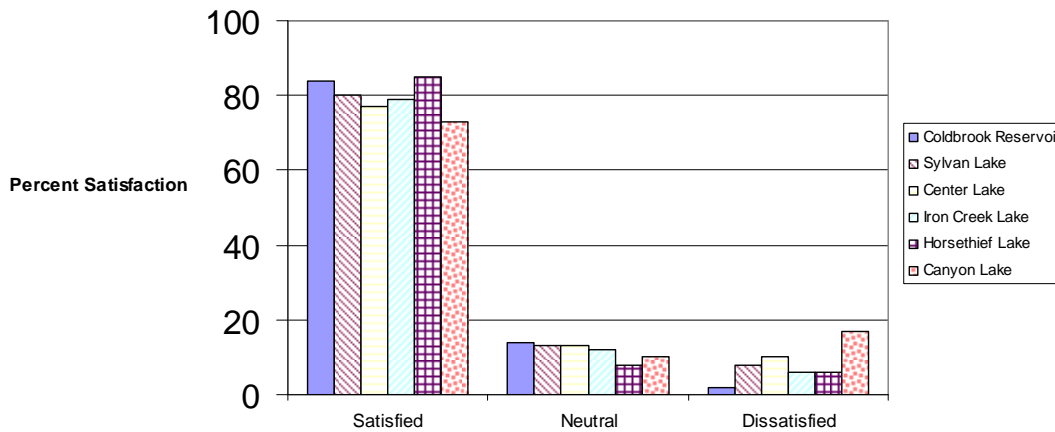


Figure 2. Small pond angler satisfaction levels during the 2007 Preference Survey.

Angler Preferences

To help guide Black Hills fisheries managers, angler expectations during the 2007 Black Hills Use and Preference Survey were measured. These specific questions have never been scientifically asked of anglers on small lakes in the Black Hills so there is no trend or level of expectation to gauge responses. In most cases the majority of anglers were not satisfied with the size of the trout caught (Table 4). The number of trout stocked in 2007 was lower than previous years due to one of the two fish hatcheries being closed for remodeling. While this does not directly address the issue of trout size, there were some issues concerning the trout length as well. Another aspect in regards to trout length is that anglers may have been accustomed to trout that have been slightly larger when two hatcheries were able to produce the catchable product at the requested size.

Table 4. Satisfaction of anglers, demographics and preference responses made during the small pond section of the 2007 Black Hills Preference Survey.

Stream Name	% SD Residency	Male Gender	Overall Satisfaction	Harvest Oriented	How was Fishing?		Satisfied with size of fish?	Pressure (hrs)
Coldbrook Reservoir	86%	76%	84%	48%	Excellent	18%	47%	2,172
					Good	38%		
					Fair	27%		
					Poor	13%		
					Very Poor	3%		
Sylvan Lake	56%	79%	80%	51%	Excellent	15%	54%	8,101
					Good	32%		
					Fair	34%		
					Poor	15%		
					Very Poor	4%		
Center Lake	78%	73%	77%	48%	Excellent	11%	38%	5,368
					Good	24%		
					Fair	23%		
					Poor	30%		
					Very Poor	12%		
Iron Creek Lake	85%	73%	79%	50%	Excellent	9%	49%	10,978
					Good	24%		
					Fair	31%		
					Poor	27%		
					Very Poor	7%		
Horsethief Lake	75%	76%	86%	35%	Excellent	18%	41%	6,407
					Good	42%		
					Fair	29%		
					Poor	7%		
					Very Poor	2%		
Canyon Lake	94%	77%	73%	42%	Excellent	4%	23%	9,486
					Good	27%		
					Fair	24%		
					Poor	25%		
					Very Poor	11%		
Total	--	--	--	--	--		--	42,512

Anglers were asked about their preferences of harvesting trout. Except for Iron Creek Lake, where many anglers answered with “no opinion”, there was only a slight trend towards catch and release (Table 4). The responses by anglers towards catch and release fishing may indicate that there are numerous alternatives involving the number of trout to stock. Alternatives for managers to examine are to increase the stocking levels in small lakes but only to a level whereby angler’s satisfaction has increased to defined goals. Due to catch and release angling, stocking levels should not need to be at high levels to reach

these goals. This process would require the timing of creel surveys to determine changes in angler satisfaction with the different stocking regimes.

Fishermen were asked their opinions towards their day of fishing. The earlier question on satisfaction differed from this question in that the former dealt with overall satisfaction and may involve many aspects such as the weather, fishing and other factors. The current question was asked just to get a benchmark for angler's satisfaction of fishing only. An almost universal pattern developed from the answers given with most respondents answering in the "good", "fair" or "poor" categories (Table 4). Much fewer anglers responded with answers of "excellent" or "very poor." It is also noted that the stocking levels in small lakes of the Black Hills during 2007 was lower than normal patterns due to the rebuilding of Cleghorn State Fish Hatchery in Rapid City. A potential objective to increase the fisherman's outlook on their day of fishing might be to increase the stocking levels with a result of increased catch rates and thus increased satisfaction.

Demographics

The demographics of a fishery aid managers in documenting the characteristics of persons using the resource. One interesting facet determined in 2007 was that at some small lakes non-resident anglers contributed up to 44% of the overall pressure (Table 4). In the case of Sylvan Lake, interviewed anglers were from 27 different states and traveled a mean distance of 451 miles to get to the Black Hills. Much of the non-resident component may be attributed to the location of some sampled waters being within the popular Custer State Park. Gigliotti (2006) performed a two-group cluster analysis on non-resident anglers from the Black Hills. He was able to break the users into two groups: catching fish low importance and catching fish high importance. Anglers in the low importance group spent more time fishing and were generally more satisfied with their fishing. High importance anglers gave lower rankings to their fishing experience, were less satisfied with their fishing trip but kept more trout than the low importance group.

Other information was also gathered during the 2007 Black Hills Creel Survey. Past surveys have indicated that resident anglers represent the majority over non-residents in the Black Hills. Although as previously noted, some small ponds in particular had a large number of non-resident anglers. The tourism component on these waters was not commonly found on other types of waters recently surveyed (Simpson 2006). Anglers on small lakes during the 2007 creel survey were predominately male (minimum 73% from Iron Creek Lake). Normally the party size was at or near 2.0 persons and the trip length lasting nearly two hours.

In his analysis of Black Hills anglers, Gigliotti (2006) utilized three different models to better differentiate the angler types of this area. Some of what Gigliotti found is that there is no classification of what of “typical” Black Hills angler looks like. The three models developed by Gigliotti (2006) were Angler Motive, Catching Fish, and Fishing Spot. The results of the different categories of anglers are complex. For some anglers catching fish is an important aspect of their participation; other anglers yield a lower priority to this category. Acceptance of restrictive regulations, harvesting fish, catching big fish and even having a “clean” fishing site are other factors that are important to particular anglers. To predict or produce the variety of expectations or desires of these different positions is not only difficult but also likely impossible.

RECOMMENDATIONS

1. Several levels of satisfaction were below those previously observed in the Black Hills. To aid in increasing the satisfaction levels, an effort to increase the catch rates should be implemented on small ponds of the Black Hills. The most obvious method of increasing catch rates, and possibly harvest is to increase the stocking levels on these particular waters.
2. Increasing the stocking levels on small lakes and ponds will add costs in regards to overall fish production at the two state fish hatcheries. Further studies directed towards determining the changes of changes in stocking levels must be conducted to justify these increased costs.
3. Increasing the stocking levels may have other solutions. Changes in the stocking sequence, size and numbers should be investigated to determine if these would increase angler satisfaction.
4. Gigliotti (2006) found that there is no “typical” angler in the Black Hills. From this study, satisfaction for the different angler types has been identified. It is in the interest of SDGFP to continue to promote or protect the identified items that are important to the different angler groups.
5. Continue to demonstrate to all user groups that you are listening to their concerns but that each public must be considered in final decisions.

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Form Interview- 01	
Interview ID	Office Space Only

Appendix

Appendix 1. Creel Survey Interview Form used by creel clerks during the 2007 Preference Creel Survey.

Refused Interview (X)	Time (Military)			Time Not Fished (Minutes)	Completed (X)	Type Of Fishing	Fish Species Sought			Party Size	Starting Location	Travel Direction
	Interview Time	Started Fishing	Stopped Fishing				1					

Water Body	Date		Time (Military)		Access Area	Creel Clerk	
	Month	Day	2007	Arrival			Departure

Angler	Gender	Age	Distance Traveled	Zip Code	State	Question Series	Question
1						0 1	
2						0 2	
3						0 3	
4						0 4	
5						0 0	

Series 01 Preference Questions:

- 1) Considering all factors, how satisfied are you with your fishing trip today?
 01=Very satisfied 02=Moderately satisfied 03=Neutral
 04=Moderately Dissatisfied 05=Very Dissatisfied 06=No Opinion

Series 02 Preference Questions:

- 2) Are you satisfied with the size of (primary species) you caught today?
 07=Yes 08=No

Series 03 Preference Questions:

- 3) Is catch and release or harvest of fish more important for your (primary species) fishing?
 09=Catch and Release 10=Harvest

Series 04 Preference Questions:

- 4) Would you support a 15-inch minimum length limit on largemouth bass in order to increase yellow perch size?
 11=Yes 12=No

Species	Number			Species	Length (mm)	Species	Length (mm)	Species	Length (mm)	Species	Length (mm)
	Kept	Release	Illegal								
1				1		11		21		31	
2				2		12		22		32	
3				3		13		23		33	
4				4		14		24		34	
5				5		15		25		35	
6				6		16		26		36	
7				7		17		27		37	
8				8		18		28		38	
9				9		19		29		39	
10				10		20		30		40	

Interview Continued (✓)	
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Appendix 2. Creel Survey Pressure Form used by creel clerks during the 2007 Black Hills Preference creel survey.

South Dakota Department of Game, Fish and Parks

Preference Creel Survey Fishing Pressure Report

Form Pressure/Aerial or Roving or Fixed	
Pressure ID	Office Space Only
Entry into Creel Database	
Date Entered/Initials	

Pressure Count #1

Water Body	Date		2007	Survey Time (Military)		Access Area	Creel Clerk	Air Temp	Cloud Cover	Wind Speed	Wind Dir	Precip	Water Temp		Op Water (x)
	Month	Day		Arrival	Departure										

Type Of Fishing	Total	Running Tally
Fishing Boats		
Bank/Shore		

Pressure Count #2

Water Body	Date		2007	Survey Time (Military)		Access Area	Creel Clerk	Air Temp	Cloud Cover	Wind Speed	Wind Dir	Precip	Water Temp		Op Water (x)
	Month	Day		Arrival	Departure										

Type Of Fishing	Total	Running Tally
Fishing Boats		
Bank/Shore		

Pressure Count #3

Water Body	Date		2007	Survey Time (Military)		Access Area	Creel Clerk	Air Temp	Cloud Cover	Wind Speed	Wind Dir	Precip	Water Temp		Op Water (x)
	Month	Day		Arrival	Departure										

Type Of Fishing	Total	Running Tally
Fishing Boats		
Bank/Shore		